

REMARKS

A new Abstract has been added to this application to overcome the objection set forth in the Office Action. The new Abstract includes less than 150 words and therefore meets the requirements of the Manual of Patent Examining Procedure.

Claims 33, 65, and 66 have been amended strike the phrase "an exhalation valve that comprises" from step (a). It was an error for applicants to have added this language to the claims since an antecedent basis for "an exhalation valve" is present in the second line of step (b).

Claims 33, 35-42, 44, 46, 49, 50, 55-59, and 64-66 remain pending in this application.

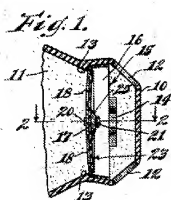
The drawings have been objected to because they allegedly include reference characters that were not mentioned in the description. The Examiner's attention is directed to the Amendments mailed April 18, 2001 and January 2, 2003. In those Amendments, reference characters 31 and 59 had been added to the specification.

Claims 33, 39, 40, 44, 46, 49, 50, 55-59, 64, and 65 have been rejected under 35 USC § 103 as being unpatentable over GB 2,072,516 to Simpson et al. in view of U.S. Patent 2,105,183 to Cover and European Publication 0252890 to Söderberg. Applicants respectfully submit that this rejection cannot be sustained.

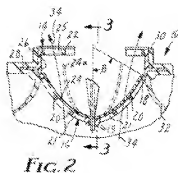
This outstanding rejection has been maintained because "[i]t would have been obvious to modify the shape of the valve seat of Simpson et al. to have a curved profile when viewed from a side elevation because it would have improved the closing action of the valve flap, improve the retention of the valve and effective registration with the apertures of the valve seat and cause the valve flap to function more efficiently as taught by Cover." Applicants respectfully submit that this particular reason for maintaining the rejection is not proper. The reason given for making the combination of Simpson and Cover is not "taught by Cover" as asserted in the Office Action. Applicants have reviewed the Cover patent in detail and have not located any portion of the specification which indicates that providing a cantilevered flap with a curved profile would improve the closing action of the valve flap; nor have applicants located any disclosure which indicates that such a curved profile would have improved the retention of the valve flap and effective registration with the apertures of the valve seat to cause the valve flap to function more efficiently. Because Cover does not teach these things, the record does not include any sound reason or evidence for sustaining a rejection based on the combination of Simpson and Cover.

In fact, the only document that demonstrates improved efficiency for a cantilevered valve while also exhibiting an ability for the flap to remain closed under any orientation is applicants' specification. As the Examiner is aware, however, applicants' own teachings cannot be used against them as a basis for making a rejection under 35 USC § 103.

Before applicants created the present invention, filtering face pieces commonly used button valves to displace exhaled air from the mask interior. Cover, which was published in 1934, also described an exhalation valve that had its flexible flap centrally mounted like a button valve. Cover discloses an exhalation valve that is centrally mounted through use of pins 20 and that has a dual-flap system for displacing exhaled air:



Another patent that uses a centrally-mounted, dual-flap system is U.S. Patent 4,934,362 to Braun:



In Examples 4-6 of applicants' specification, comparative performance data was generated with respect to applicants' invention (Example 4) and reproductions of Braun's working examples (Examples 5 and 6). The results of these tests are set forth in Table 1 of applicants' specification and are reproduced below for ease of reference:

TABLE 1

<i>Example</i>	<i>Orifice Area (cm²)</i>	<i>Pressure Drop (Pascals)</i>	<i>Airflow Resistance Force (Newtons)</i>
4	5.3	26.46	0.0140
5*	5.3	60.76	0.0322
6*	13.5	17.64	0.0238

*Comparative examples corresponding to examples 2 and 4 of the '362 patent, respectively.

As the data indicates, applicants' invention exhibits far less airflow resistance force than that of Braun.¹ Although Braun is different from Cover in that it has a greater curvature to its valve seat, a person of ordinary skill could reasonably expect that applicants' invention would perform similarly superior to the valve disclosed in Cover because both Braun and Cover are dual-flap valve systems. Both Braun and Cover place their mounting hardware in a central location, which can interfere with the flow of air through the valve orifice. Neither document provides any representation or expectation that its teachings could deliver better "closing action" or "improved efficiency" to a cantilevered exhalation valve. Cover only makes such representations with respect to its centrally-mounted, dual-flap exhalation valve.

Secondly, Cover does not indicate that the mounting hardware should be placed at one end of the flap. Cover also does not describe how to keep the flap closed if the mounting hardware is placed at one end. As late as 1987, the prior art, in fact, recognized that the placement of the mounting hardware at one end of a dual-flap system would create troubles in enabling the flap to remain closed under any orientation of the valve. For example, Braun states that "if the flap is too long, it might not have sufficient resilience to become quickly seated and to resist extraneous unseating forces."² Additionally, Braun indicates that a larger radius of curvature in a dual-flap system would tend to make the seal unreliable:

¹ Less airflow resistance is better because air can be purged more easily from the mask interior. The mask wearer does not need to supply as much energy to operate the valve.

² See U.S. Patent 4,934,362 to Braun at column 3, lines 40-43.

A smaller radius of curvature would provide a better seal, but this would tend to make the seal ridge more expensive to manufacture. While a larger radius of curvature would be more economical, the seal may not be as reliable.³

As you can see by comparing Figure 2 of Braun with Figure 1 of Cover, Cover's valve seat has a much larger radius of curvature than the Braun valve seat. Thus, Braun demonstrates that persons of ordinary skill did not appreciate the fact that you could use a single flap system (as opposed to a dual-flap system) whereby the mounting hardware was disposed at one end of the flap and the orifice was located wholly below the flap and that you could achieve a reliable seal under any orientation of the flap.

Thirdly, Cover does not suggest applicants' claimed structure. In Cover, the flap is pressed against the seal surface by virtue of having apertures 24 smaller than the size of the cylindrical portion 22 of the pins 20. Cover states that the valve flap can seat in a "cone-like manner about the reduced portions 22 of the pins 20". Cover states that it is these curved portions 25 that are generated at the mounting pins 20 that are responsible for having the valve flap forced "to lie snugly upon the base plate 17".

Fourthly, the primary reference to Simpson leads a person of ordinary skill away from applicants' invention. Although Simpson describes a cantilevered exhalation valve, it does not describe applicants' step of supporting the single flap under the four conditions outlined in step (b) of applicants' claimed method. Simpson describes a flexible flap that would remain in a planar condition when in a closed state. There also are no forces that act upon the Simpson flap that would cause it to be pressed against the seal surface. As such, Simpson teaches the use of an antechamber, as described on page 1, lines 59-64, to prevent the wearer from inhaling harmful contaminants if the valve leaks during operation.

Thus, both Simpson and Cover describe a different means for allowing the flexible flap to be pressed against the seal surface. As indicated, Cover uses apertures 24 in the flexible flap that are smaller than the pins 20 to achieve a good seal. Cover does not suggest supporting a single flexible flap non-centrally and operatively relative to the orifice to create a curved profile whereby the flap can be pressed against the seal surface in a closed state and held in that position under any orientation of the valve. Cover suggests using a centrally-mounted, dual flexible flap that has

³ *Id.* at column 3, lines 6-10.

mounting openings that are smaller than the mounting pins. If Cover were to move its seal surface towards one end of its valve such that its dual flap construction was converted to a seal single flap construction, there would be no guarantee that the resulting structure would be able to be pressed towards the seal surface in a closed state under any orientation of the valve. The Federal Circuit has stated that "[t]he consistent criterion for determination of obviousness" is whether the prior art would have suggested to one of ordinary skill in the art that the invention is suggested and "would have a reasonable **likelihood of success**, [when] viewed in light of the prior art."⁴ The Federal Circuit has made clear that "[b]oth the suggestion and the expectation of success must be founded in the prior art, not in applicant's disclosure."⁵ Even if Simpson's valve would have been modified to have a curved flap, there is no evidence that it would have been expected to result in a reliable seal. The substitution of a curved flap in Simpson's valve would likely have left the flap dangling away from the valve seat in most orientations, and thus would not form a successful seal. Further, the concept of moving Cover's mounting hardware to the side of a curved valve seat is not suggested in the prior art as later established by Braun, but even if were, it would not have been expected to result in a reliable seal. The record therefore demonstrates that the prior art fails to suggest applicants' claimed structure and its likelihood of success.

The Examiner has also cited Söderberg for sustaining the rejection based on the combination of Simpson and Cover if that combination would not have provided a valve flap that could be held in its closed state under any orientation. In so doing, the Examiner indicates that "[i]t would have been obvious to further modify the edge of the valve membrane of Simpson et al. to include a beveled edge to aid in maintaining a seal with the valve seat under any orientation of the valve device as taught by Söderberg." Whether Simpson could be so modified by Söderberg, does not, however, suggest applicants' invention. To the contrary, Söderberg's teaching of using a beveled edge leads a person of ordinary skill away from applicants' invention. Söderberg asserts that by applying a beveled edge to a cantilevered flexible flap that such a structure will help keep the valve flap pressed against the seal surface. Söderberg does not present any working evidence to suggest that this is the case. Nonetheless, even if we assume that such a structure would allow the flap to be pressed against the seal surface,

⁴ *In re Dow Chemical*, 837 F.2d 469, 473, 5 USPQ2d 1529, 1531, (Fed. Cir. 1988).

⁵ *Id.*

Söderberg is achieving the ability of a cantilevered flap to remain closed under any orientation through a means very different than that suggested and claimed by applicants. Applicants claim a particular single flexible flap construction and arrangement which enable the flap to be held in its closed state.⁶

Söderberg does not teach or suggest such features but rather suggests the use of a beveled edge. Because both Söderberg and Simpson were filed long after the publication of Cover, and because neither document teaches or suggests the use of any of Cover's technology in those documents, they both provide very good evidence of the nonobviousness of applicants' invention. Further, the fact that Simpson teaches the use of an antechamber to prevent valve leakage, and Söderberg teaches the use of a beveled edge to keep the valve closed, these documents both clearly establish that applicants' invention was not appreciated by persons of ordinary skill.

Additionally, as the Examiner knows, it is impermissible to pick and choose only those elements of a reference that match the claimed invention — the Examiner must consider the prior art as a whole. If we assume for the sake of argument that there would have been a motivation to combine Cover with Simpson, that motivation would logically include Cover's centrally disposed mounting arrangement, which plays a critical role in Cover's valve design. The Examiner cannot properly select only Cover's concave base plate while ignoring Cover's express teaching of centrally disposed mounting pins that are larger than the flap openings. Please also note that the subsequently developed Braun valve, mentioned above, teaches away from moving the mounting hardware to one end of the valve. Braun states that his dual-flap valve provides "a significantly lower pressure drop [when] compared to values of the same size." Therefore, the prior art reflects a state-of-the-art that leads a person of ordinary skill to a flap that had a centrally-disposed stationary portion to achieve an efficient valve where the flap remains closed at any orientation. The combination of Simpson, Cover, and Söderberg therefore would not have rendered applicants' claimed invention obvious to a person of ordinary skill within the meaning of 35 USC § 103.

⁶ Söderberg also suggests "[m]aking the distance between the upsets 15 and the lower side of the valve membrane shorter than the thickness of the valve seat" to ensure a good seal, which also teaches away from applicants' invention.

For the above reasons, applicants submit that the rejection under 35 USC § 103 should be withdrawn.

Respectfully submitted,

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Date

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